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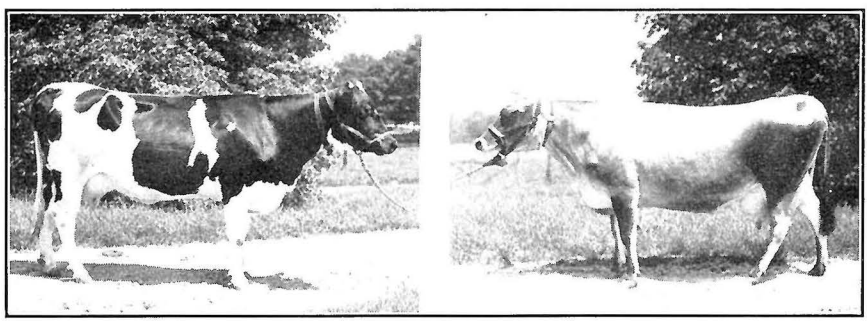
The Use of Wheat in Dairy Grain Mixtures

Department of Dairy Industry



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AVERAGE MONTHLY PRODUCTION:

	Milk *Lb.*	Fat *Lb.*	Fat %	Milk *Lb.*	Fat *Lb.*	Fat %	
On wheat	1098.9	50.9	4.63	1009.8	50.8	5.03	On wheat
On corn	1194.0	52.6	4.40	1059.6	50.9	4.80	On corn

(See page 3)

OHIO AGRICULTURAL EXPERIMENT STATION

Wooster, Ohio

THE USE OF WHEAT IN DAIRY GRAIN MIXTURES

FOREWORD

In the early 1930's the low price of wheat led to many inquiries about the feeding value of this grain for dairy cows. It was known that wheat had been fed to dairy cattle, but reports of results of experiments on feeding this grain to dairy cows were meager and scattered. This led to feeding trials with wheat at Wooster, the results of which have been reported from time to time in various Ohio Experiment Station publications.[1]

On the basis of chemical analyses wheat is somewhat higher in protein but considerably lower in fat than corn. However, wheat contains slightly more total digestible nutrients and might be expected, therefore, to be at least equal in feeding value to corn. Chemical composition alone, however, cannot be used as a criterion of relative nutritive values. Yellow corn, for example, contains pro-vitamin A (carotene); wheat contains very little pro-vitamin A; and palatability and physiological effect cannot be measured by ordinary chemical determinations.

There have been rumors that wheat is not palatable, that it contains toxic substances, and even that it sometimes causes abortions. These ideas may have arisen from some work done years ago at the University of Wisconsin in which the wheat plant and products derived from it constituted the entire ration fed to cows. The disastrous results obtained on this ration are now known to have been caused by mineral and vitamin deficiencies and not by any harmful substances in wheat. It must be remembered, too, that for a long time wheat has been the "staff of life" for man.

The present feed situation caused by conditions accompanying World War II, together with general lack of readily available information regarding the real feeding value of wheat, suggested the desirability of summarizing in one publication the work done by the Ohio Experiment Station on the feeding value of wheat for dairy cattle.

EXPERIMENTAL

Since corn is a usual constituent of grain mixtures for dairy cattle in many parts of the country and because of the similarity in chemical composition of wheat and corn, the replacement value of wheat for corn was given prominence in the feeding experiments conducted.

EXPERIMENT 1. VALUE OF A GRAIN MIXTURE CONTAINING ONE-THIRD WHEAT

Two lots of six cows each (four Jerseys and two Holsteins) were fed alfalfa hay and corn silage. One lot received, in addition, a grain mixture containing 400 parts (by weight) of yellow corn, 300 of oats, 100 of bran, 100 of linseed oil meal, and 9 of salt. The other lot received a grain mixture containing the same ingredients but in which 300 of the 400 parts of corn were replaced by 300 parts of wheat. This made a grain mixture containing one-third wheat, constituted as follows: wheat 300, corn 100, oats 300, bran 100, linseed oil meal 100, and salt 9.

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[1]Ohio Agr. Exp. Sta. Bimo. Bull. Nov.-Dec., 1931.
Ohio Agr. Exp. Sta. Bimo. Bull. Sept.-Oct., 1932.

Hay and corn silage were fed according to liveweight and grain according to milk production for 75 days, after which the cows were reversed and fed for an additional 75-day period. Thus, each cow was on the corn ration 75 days and on the wheat ration 75 days. When the production records were analyzed it was found that the cows averaged 801.4 pounds of milk and 40.9 pounds of fat on the wheat ration and 790.9 pounds of milk and 38.7 pounds of fat on the corn ration monthly. The cows gained a little more in liveweight when on the corn ration than when on the wheat ration. In this and the other trials reported, milk from the wheat-fed cows tested slightly higher in butterfat than that from the corn-fed cows.

At the end of this trial eight cows were still in a suitable stage of lactation to permit another 75-day feeding period, after again reversing the grain mixtures fed. Reducing the records of these cows to a monthly basis showed that the wheat ration produced 852.9 pounds of milk and 43.7 pounds of butterfat, while the corn ration produced 872.6 pounds of milk and 43.3 pounds of fat. The higher producing cows averaged 1087.5 pounds of milk and 48.9 pounds of fat on the corn ration and 1049.6 pounds of milk and 48.4 pounds of fat on the wheat ration, per month. This is good production. Two of the cows used in this experiment are shown on the front cover (Fig. 1).

EXPERIMENT 2. VALUE OF A GRAIN MIXTURE CONTAINING 40 PER CENT WHEAT

Eleven cows were fed continuously for 7 months on mixed hay (clover and timothy) and the following grain mixture containing 40 per cent wheat: 400 parts (by weight) of wheat, 300 of oats, 100 of wheat bran, 200 of linseed oil meal, and 10 of salt. The cows produced normally on this ration and eight of the eleven dropped normal calves. The other three were carrying calves at the end of the experiment. No ill effects were observed during this period but the liveweights of these cows, especially of those in heavy production, were not quite up to the standard of previous lactations.

EXPERIMENT 3. VALUE OF A HOME-GROWN GRAIN MIXTURE CONTAINING 50 PER CENT WHEAT

A third experiment similar to Experiment 1, except that one of the grain mixtures contained 50 per cent wheat instead of 33⅓ per cent and consisted only of home-grown feeds, was conducted. The wheat ration contained, by weight, 500 parts of wheat, 250 of corn, 250 of oats, 20 of bone meal, and 10 of salt; the corn ration contained 400 of corn, 300 of oats, 100 of wheat bran, 100 of linseed oil meal, and 9 of salt. Five Jerseys and one Holstein comprised each of two lots which received one of the grain mixtures for 75 days and then was switched to the other grain mixture for another 75-day period. The average monthly production on the wheat mixture was 773.0 pounds of milk and 38.2 pounds of fat, and on the corn ration 787.8 pounds of milk and 38.7 pounds of fat.

Three Jerseys in each lot were continued for another 75-day period after reversing the grain mixtures that they were fed. During the time these cows were on the home-grown wheat ration they averaged, per month, 763.5 pounds of milk and 40.9 pounds of fat; on the corn ration these same cows averaged, per month, 779.1 pounds of milk and 40.5 pounds of fat. Gains in liveweight were similar on each ration.

A third group of cows was fed the home-grown wheat ration for 5 to 7 months, during part of which time some of the cows were dry. The cows produced well when in milk and seemed to be normal in every noticeable respect.

EXPERIMENT 4. VALUE OF A GRAIN MIXTURE CONTAINING 100 PER CENT WHEAT

In order to give wheat a severe trial two Jersey cows were fed coarsely ground wheat as the only grain for a full lactation. Two per cent of steamed bone meal was added to the wheat. Alfalfa hay was fed as the only roughage. In a lactation of 365 days one of these cows produced 9,824 pounds of milk containing 474.4 pounds of fat. During this time she ate 4,571 pounds of wheat, or 12.5 pounds daily. The other cow, a low producer, gave 4,584 pounds of milk containing 274 pounds of fat in 278 days and consumed 2,801 pounds of wheat, or 10 pounds daily. This short lactation was due to an early breeding. The cow dropped twin heifer calves which had crooked legs and were a little weak. It is doubtful if the ration was responsible for this since the bone meal and alfalfa hay should have supplied minerals and vitamins adequately. No ill effects on the cows were noted, and no apparent dislike for the wheat developed.

EXPERIMENT 5. THE QUALITY OF BUTTER AND CHEESE MADE FROM MILK OF WHEAT-FED COWS

Butter made from cream produced by the cows on the 50 per cent wheat ration (Experiment 3) was slightly inferior to that from the cows on the control ration containing no wheat. This difference varied somewhat with the various lots of cream.

Swiss cheese made from milk produced by these cows was of good quality, as is indicated in the illustration (Fig. 2).

Biological assays for vitamin A potency were made on the butterfat of cows receiving the control ration containing corn instead of wheat. The vitamin A content of the butterfat from the 50 per cent wheat ration group was slightly lower than that of the corn-fed group. The butterfat from the cows fed wheat exclusively was much lower in vitamin A potency than that produced on a normal ration and was noticeably lighter in color. This is to be expected since yellow corn contains considerable carotene (pro-vitamin A) and wheat does not. Apparently, too, the carotene content of the hay fed was not sufficiently high to offset the difference in vitamin A content of the grain mixtures.

EXPERIMENT 6. CAN SCABBY WHEAT BE FED?

Wheat from a field known to be heavily infected with scab was cleaned and the screenings were saved for feeding. About 30 per cent of the grains in the screenings was infected with scab, according to actual counts made by R. C. Thomas of the Department of Botany and Plant Pathology. These scab-infected screenings were substituted for corn in a regular dairy grain mixture so that they constituted 44 per cent of the total. This mixture was fed to dairy cows continuously for 3 months without harmful effects being noted. The feed mixture containing scabby wheat seemed to be eaten with as much relish as one containing corn. No production data were obtained in this trial.

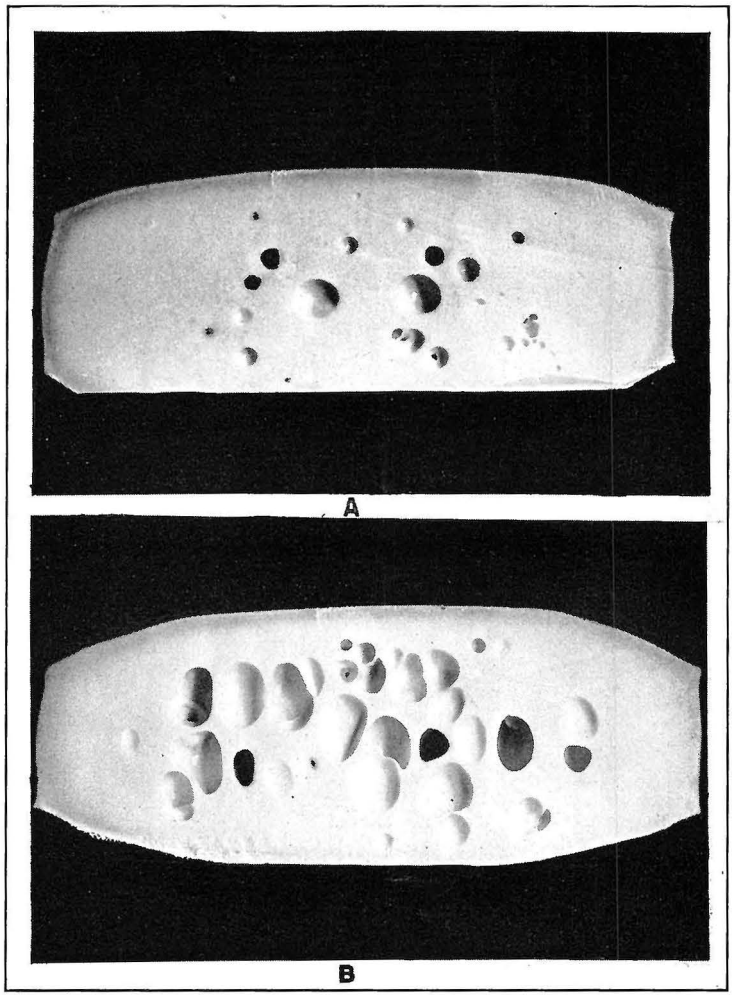

Fig. 2.—Swiss cheese made from milk produced on the two rations:

A. From check ration containing no wheat.

B. From home-grown grain mixture containing approximately 50 per cent wheat.

SUMMARY AND RECOMMENDATIONS

Feeding experiments with dairy cows in which wheat constituted from 33⅓ per cent to 100 per cent of the grain indicate clearly that it is safe for dairymen to feed wheat quite liberally and that results about equal to those from corn may be anticipated. Wheat weighs about 7 per cent more per bushel than corn and should, therefore, be worth at least 7 per cent more per bushel as a feed than corn. When the price of wheat warrants, and particularly when corn supplies are short or the wheat is of low grade, wheat may safely be substituted for corn or may be included in the grain up to 50 per cent of the mixture. Larger amounts may be fed for short periods, but, as a general rule, extremes of feeding are to be avoided. As the percentage of wheat in the grain mixtures increases, the need for feeding high-quality hay liberally and of including corn or grass silage becomes greater so as to insure an adequate intake of vitamin A.

Wheat contains only about 10 per cent bran; therefore, wheat should not be regarded as a replacement for wheat bran.

Wheat should be coarsely ground before feeding, as finely ground wheat tends to form a pasty or gummy mass in the process of digestion.

It is usually desirable to make substitutions in dairy grain mixtures gradually. In case of emergency, however, several experiences have shown that the shift from corn to wheat can be abrupt.

Scabby wheat can be fed safely in reasonable quantities for several months. Wheat that is badly molded or quite musty should be fed with caution; in certain cases it may even be unfit for feeding. When there is any question as to the advisability of feeding wheat, probably the safest procedure would be to feed only one or two of the least valuable animals before attempting to feed the entire herd.

There seems to be no experimental evidence on the value of wheat for dairy animals other than cows. It can only be assumed that reasonable use of wheat for calves, heifers, and bulls would give satisfactory results, especially if good roughage is fed.